

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

BRAKE SYSTEM

1997 BRAKES Disc & Drum - General Motors

DESCRIPTION & OPERATION

NOTE: Information in this article also applies to vehicles equipped with Anti-Lock Brake System (ABS); however, not all information on ABS is included in this article. See ANTI-LOCK BRAKE SYSTEM article.

NOTE: Brake drum can be removed without removing axle shaft.

BRAKE SHOE ASSEMBLY

Vehicles are equipped with dual-servo brakes, identified by adjuster screw hole at bottom of backing plate. Brake assembly consists of backing plate, brake shoes, return springs, automatic adjusting assembly and a wheel cylinder. Automatic adjusting assembly consists of an actuator lever, return spring, actuator link, adjusting screw and spring. Automatic adjustment is accomplished through movement of actuating lever and secondary shoe.

BRAKE WARNING LIGHT

Pressure differential warning switch in combination valve energizes brake warning light on instrument panel when front or rear brakes lose hydraulic pressure. After repairing failed side of hydraulic system, depress brake pedal with moderate to heavy pressure to hydraulically center the piston. This will turn off brake warning light.

CALIPERS

Front brakes are floating caliper or sliding caliper design. See Fig. 5 and Fig. 8 . Rear brakes are sliding caliper design. Caliper is attached to caliper mount. Caliper is mounted to steering knuckle or caliper adapter, depending on application. Caliper assembly slides back and forth in machined cut-outs.

HYDRAULIC CONTROL VALVES

Combination Valve

System uses a combination valve to regulate brake system hydraulic pressure. Combination valve, located in brake lines between master cylinder and wheels, has 3 pressure control functions:

- Metering (or hold-off) section of valve limits pressure to front brakes until pressure of rear brake shoe retractor springs is overcome, then allows pressure to front brakes.
- Warning switch section of valve constantly compares front and rear brake pressures from master cylinder. See BRAKE WARNING LIGHT under DESCRIPTION & OPERATION .
- Proportioning section of valve allows input pressure to rise to predetermined level before allowing output pressure to rear brakes. This prevents rear wheel lock-up on vehicles with light rear wheel loads.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

Combination valve also contains a by-pass feature. This ensures full system pressure is applied to rear brakes if front brakes lose hydraulic pressure (or if rear brakes lose hydraulic pressure, full pressure is applied to front brakes).

BLEEDING BRAKE SYSTEM

MASTER CYLINDER BLEEDING

NOTE: To prevent air from entering brake system, bench bleed master cylinder before installing.

1. Place master cylinder in soft-jawed vise with front end tilted slightly down. DO NOT overtighten vise. Plug both outlet ports of master cylinder. Fill master cylinder reservoir.
2. Press and release piston about 1" (25 mm) several times. As air is bled from master cylinder, the primary piston will not travel the full 1" (25 mm) stroke.
3. Repeat previous step with front end of master cylinder tilted slightly up. Reposition master cylinder in vise to level position. Loosen front outlet plug and push piston into bore to expel air from cylinder. Tighten plug and allow piston to return to original position. Repeat procedure at rear outlet plug.
4. Fill reservoir and install master cylinder. DO NOT fully tighten brake lines at this time. Slowly press brake pedal to floor and hold. Tighten brake lines. Release brake pedal. Bleed brake system. See MANUAL BLEEDING or PRESSURE BLEEDING.

MANUAL BLEEDING

NOTE: Air tends to cling to caliper walls. When bleeding vehicles with disc brakes, lightly tap caliper to help remove air.

1. Deplete vacuum reserve from power brake booster by depressing brake pedal several times with engine off. Fill master cylinder and keep at least half full during bleeding procedure. If master cylinder is not known or suspected to have air in bore, go to step 4). If master cylinder is known or suspected to have air in bore, go to next step.
2. Disconnect forward brakeline fitting at master cylinder. Allow fluid to flow from fitting. Tighten fitting to specification. See TORQUE SPECIFICATIONS . Have an assistant depress brake pedal slowly and hold. Loosen forward fitting. Tighten fitting while pedal is still at floor. Release brake pedal slowly. Wait 15 seconds.

NOTE: Rapid pumping of brake pedal causes master cylinder secondary piston to move into a position that makes bleeding system difficult.

3. Repeat step 2), including 15 second wait, until fluid is clear and free of air bubbles. Repeat procedure at other (rearmost) brakeline fitting on master cylinder. Master cylinder is now bled. If wheel cylinders/calipers are not suspected to have air in them, it is not necessary to bleed them.

NOTE: On vehicles with 4WAL, if Brake Pressure Modulator Valve was replaced,

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

or is suspected to have air trapped inside, it must be bled next. See ANTI-LOCK BRAKE SYSTEM article.

4. If wheel cylinders/calipers are known or suspected to have air in them, raise and support vehicle. Remove bleeder valve cap from right rear wheel. Place proper size box end wrench over bleeder valve. Attach one end of clear tube over valve and submerge other end in container partially filled with clean brake fluid.
5. Have an assistant depress brake pedal slowly and hold. Loosen bleeder valve to purge air from cylinder. Tighten bleeder valve and slowly release brake pedal. Wait 15 seconds. Repeat sequence, including 15 second wait, until all air is removed.
6. Remove tube and wrench. Repeat step 5) at left rear, right front, and left front wheels in this order. Fill master cylinder reservoir, and install cover. Ensure there is no sponginess in brake pedal and that BRAKE warning light is off.

PRESSURE BLEEDING

NOTE: **Air tends to cling to caliper walls. When bleeding vehicles with disc brakes, lightly tap caliper to help remove air.**

WARNING: **DO NOT use rigid clamp to position hold-off valve stem. This may damage valve assembly, causing brake failure.**

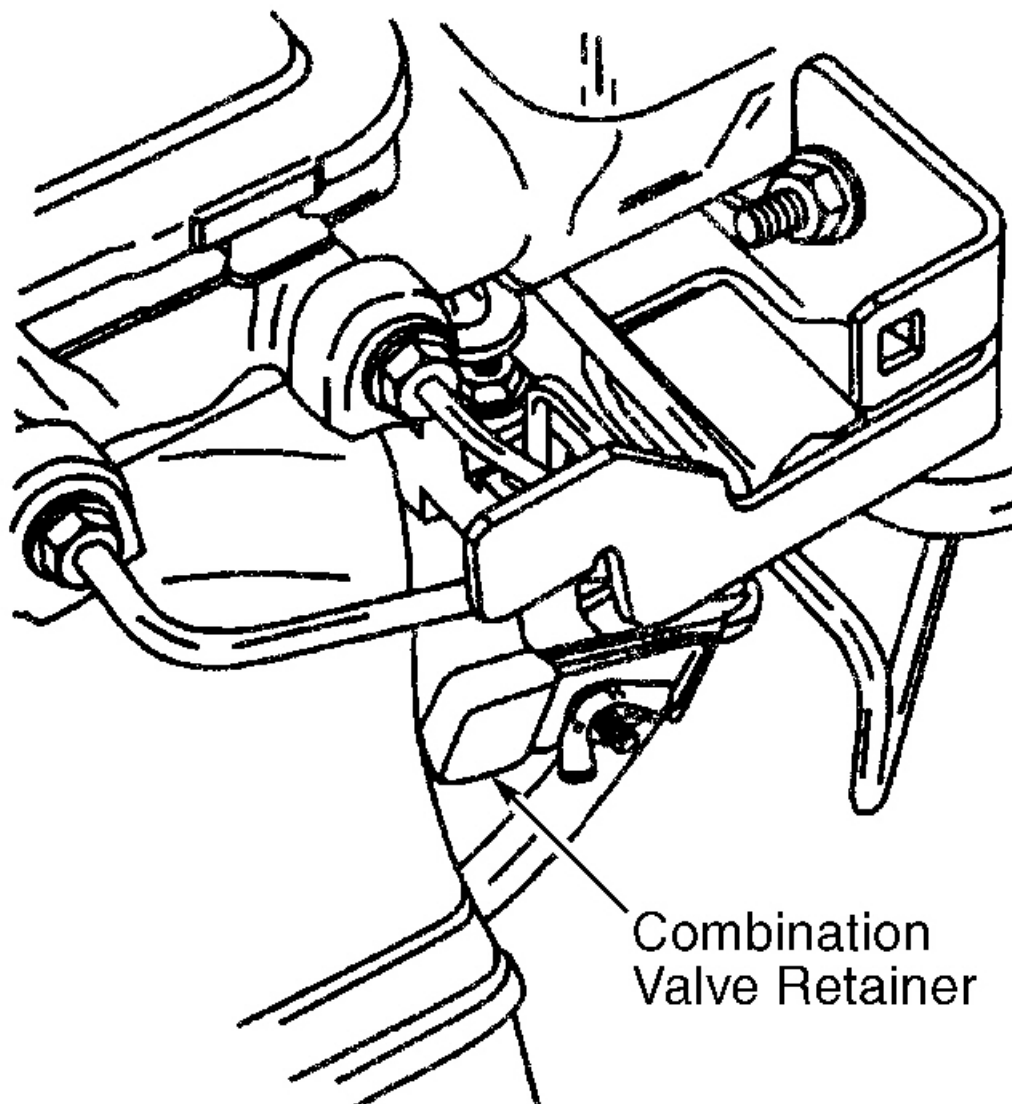
1. Retain hold-off valve stem of combination valve using Valve Retainer (J-39177). See **Fig. 1** . This allows brake fluid to flow through combination valve and entire system during bleeding.
2. Clean master cylinder cap and surrounding area. Remove cap. With pressure tank at least 2/3 full, connect pressure bleeder to master cylinder with adapters. Attach bleeder hose to right rear bleeder valve.

NOTE: **On vehicles with 4WAL, if Brake Pressure Modulator Valve was replaced, or is suspected to have air trapped inside, it must be bled next. See ANTI-LOCK BRAKE SYSTEM article.**

3. Place other end of hose in glass jar partially filled with brake fluid so end of hose is submerged in fluid. Open release valve on pressure bleeder. Set pressure bleeder to 20-25 psi (1.4-1.8 kg/cm²) or pressure specified by equipment manufacturer.
4. Open bleeder screw 3/4 - 1 turn and note fluid flow. Close bleeder screw when no air bubbles are present in fluid flow. Repeat procedure on left rear, right front, and left front wheels in this order.
5. Check brake pedal operation. Remove pressure bleeder. Remove valve retainer from hold-off valve. Refill master cylinder reservoir, if necessary.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors



95B27103

Fig. 1: Positioning Hold-Off Valve On Combination Valve (Typical)
Courtesy of GENERAL MOTORS CORP.

ADJUSTMENTS

PARKING BRAKE

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

NOTE: Ensure rear brake shoes are adjusted before adjusting parking brake. See **REAR BRAKE SHOES** under **ADJUSTMENTS** .

Raise and support vehicle. Loosen parking brake cable adjusting nut. Fully release parking brake pedal. Tighten adjusting nut until wheels will not rotate forward without excessive force. Back off adjusting nut until little or no drag exists when wheels are rotated forward. Lower vehicle.

REAR BRAKE SHOES

1. Ensure parking brake is released. Raise and support vehicle. Knock out lanced area in backing plate with a punch (if not already removed) and remove from brake assembly.
2. Working through hole in backing plate, rotate adjusting screw until brake shoes expand and wheels can just be turned by hand. Ensure drag is equal at both wheels. Back off adjusting screw 24 notches at each wheel.
3. If heavy drag is present after adjusting screw is backed off 12 notches, check parking brake adjustment. See **PARKING BRAKE** under **ADJUSTMENTS** . To complete procedure, install plug in backing plate. Check parking brake adjustment.

STOPLIGHT SWITCH

NOTE: Stoplight switch is installed along with brake push rod and is not adjustable.

TESTING

BRAKE WARNING LIGHT

Electrical Circuit

Disconnect wire from switch terminal on combination valve. Connect wire to ground. Turn ignition on. If brake warning light does not come on, repair brake warning light bulb or wiring circuit. If light operates, brake warning light electrical circuit is okay.

Warning Light Switch

1. Fill master cylinder reservoir. Attach bleeder hose to bleeder screw at either rear wheel. Immerse other end of hose in container of brake fluid. Turn ignition on.
2. While depressing brake pedal, open bleeder screw (close bleeder screw before releasing pedal). If light comes on, go to next step. If light does not come on, switch is defective; replace combination valve.
3. Close bleeder screw. Depress brake pedal with moderate to heavy pressure. If light goes out, switch is okay. If light stays on, switch is defective, replace combination valve. Repeat test on front brake system. System should function in same manner as rear.

REMOVAL & INSTALLATION

FRONT BRAKE CALIPER

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

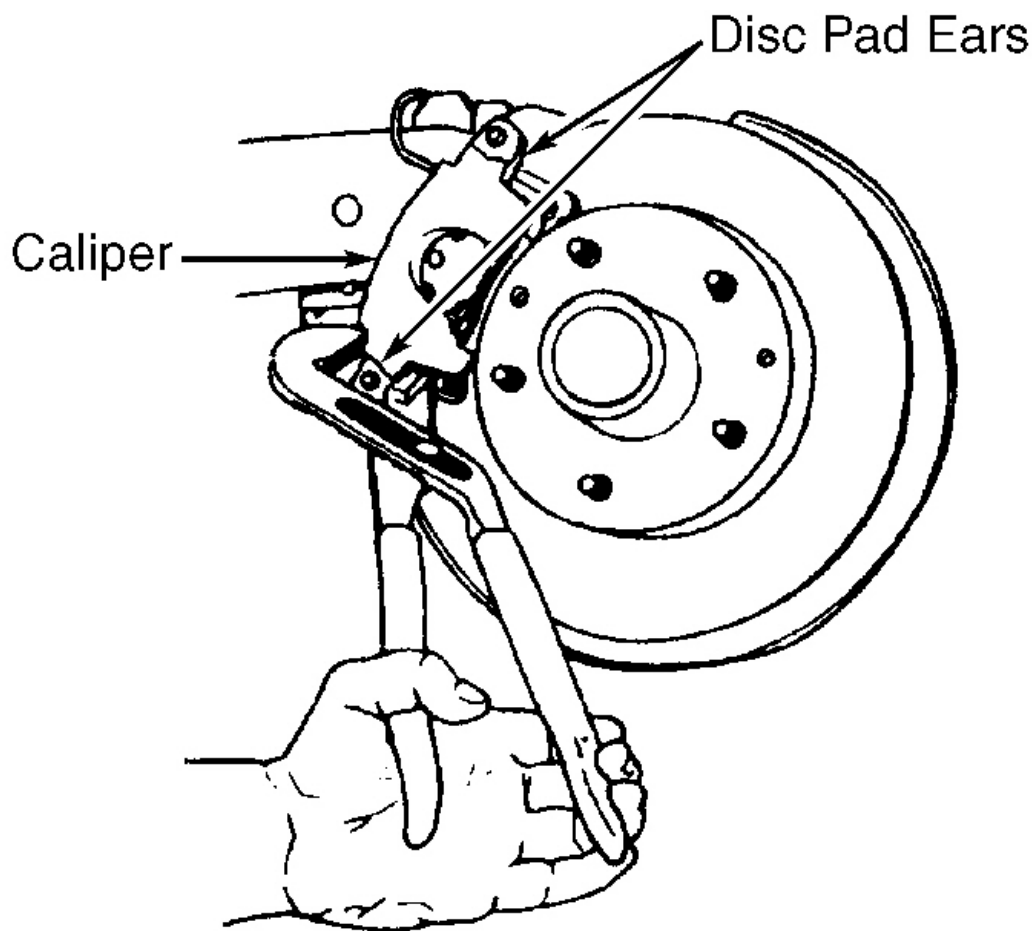
NOTE: For front disc pad removal and installation, perform **FRONT BRAKE CALIPER** removal and installation procedures but do not disconnect brake hose from caliper (hang caliper out of way with wire). Replace all pads on an axle if wear indicator on any pad contacts rotor or if pad is worn to within 1/32" (.8 mm) of pad backing.

Removal (Floating Caliper)

1. Remove two-thirds of brake fluid from master cylinder. Raise and support vehicle. Remove wheel. Using "C" clamp or large pliers, compress caliper piston until it bottoms in its bore.
2. Disconnect brake hose from caliper. Remove caliper guide pins. See **Fig. 3** . Remove caliper. Remove pads from caliper. Note retainer spring on inner pad (some models) and remove if replacing pads.

Installation

1. Remove caliper sleeves from caliper. See **Fig. 3** . Apply silicone grease to outer diameter of caliper sleeves and inner diameter of bushings. Insert caliper sleeves into bushings.
2. Install retainer spring on inner pad (if removed). Install pads in caliper. Install caliper. Install guide pins and tighten to specification. See **TORQUE SPECIFICATIONS** .
3. Connect brake hose to caliper and tighten hose bolt to 32 ft. lbs. (43 N.m). Bleed brake system. See **MANUAL BLEEDING** or **PRESSURE BLEEDING** under **BLEEDING BRAKE SYSTEM** .
4. If outer pads are equipped with locking ears, bend ears toward caliper until ears touch caliper. This prevents movement of outer pad in caliper. See **Fig. 2** . Install wheel.



G91113506

Fig. 2: Bending Outer Pad Ears Toward Caliper
Courtesy of GENERAL MOTORS CORP.

Removal (Sliding Caliper)

1. Remove two-thirds of brake fluid from master cylinder. Raise and support vehicle. Remove wheel. Using "C" clamp or large pliers, compress caliper piston until it bottoms in its bore.
2. Disconnect brake hose from caliper. Remove caliper support key bolt. See **Fig. 5** . Using hammer and brass punch, drive out caliper support key and spring. Remove caliper. Remove inner and outer pads.

Installation

1. Using wire brush, clean corrosion from machined ways on caliper and caliper mount. Apply silicone

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

grease to these surfaces. Install inner pad and anti-rattle spring on caliper mount. See **Fig. 5** . Install outer pad in caliper. Place caliper on caliper mount.

2. Install caliper support key and spring. Install caliper support key bolt, ensuring bolt boss fits into circular cutout on caliper support key. Tighten bolt to 15 ft. lbs. (20 N.m).
3. Connect brake hose to caliper and tighten hose bolt to specification. See **TORQUE SPECIFICATIONS** . Bleed brake system. See **MANUAL BLEEDING** or **PRESSURE BLEEDING** under **BLEEDING BRAKE SYSTEM** . Install wheel.

FRONT BRAKE ROTOR

Removal (2WD)

Remove brake caliper (DO NOT disconnect brake hose). See **FRONT BRAKE CALIPER** under **REMOVAL & INSTALLATION**. Remove grease cap from end of hub. Remove cotter pin, nut, washer and outer bearing. Remove rotor and hub assembly.

Inspection

Inspect rotor lateral runout and parallelism. See **DISC BRAKE SPECIFICATIONS** . If lateral runout cannot be corrected check hub bearing for excessive lateral runout or looseness. Hub bearing assembly lateral runout cannot exceed .0016" (.040 mm).

Installation

1. Clean and pack wheel bearings. Install rotor and hub assembly. Install outer bearing, washer and nut. Tighten nut to 12 ft. lbs. (16 N.m) while rotating rotor and hub assembly. This seats bearings.
2. Back off nut until it just begins to loosen. Finger-tighten nut. Back off nut until hole in spindle aligns with hole in nut (DO NOT back off more than 1/2 of a flat). Install new cotter pin, bend ends over and ensure ends will not contact grease cap when installed. To complete installation, reverse removal procedure.

Removal & Installation (4WD)

Remove brake caliper (DO NOT disconnect brake hose). See **FRONT BRAKE CALIPER** under **REMOVAL & INSTALLATION**. Remove rotor. To install, reverse removal procedure.

REAR BRAKE CALIPER

NOTE: For rear disc pad removal and installation, perform **REAR BRAKE CALIPER** removal and installation procedures but **DO NOT** disconnect brake hose from caliper (hang caliper out of way with wire). Replace all pads on an axle if wear indicator on any pad contacts rotor or if pad is worn to within 1/32" (.8 mm) of pad backing.

Removal

1. Remove two-thirds of brake fluid from master cylinder. Raise and support vehicle. Remove wheel. Using

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

"C" clamp or large pliers, compress caliper piston until it bottoms in its bore.

2. Disconnect brake hose from caliper. Remove caliper support key bolt. See **Fig. 5** . Drive out caliper support key and spring. Remove caliper. Remove inner and outer pads.

Installation

1. Clean corrosion from machined ways on caliper and caliper mount. Apply silicone grease to these surfaces. Install inner pad and anti-rattle spring on caliper mount. Install outer pad in caliper. Install caliper.
2. Install caliper support key and spring. Install caliper support key bolt, ensuring bolt boss fits into circular cutout on caliper support key. Tighten bolt to 15 ft. lbs. (20 N.m).
3. Connect brake hose to caliper and tighten hose bolt to specification. See **TORQUE SPECIFICATIONS** . Bleed brake system. See MANUAL BLEEDING or PRESSURE BLEEDING under **BLEEDING BRAKE SYSTEM** . Install wheel.

REAR BRAKE DRUM

Removal & Installation

Ensure parking brake is released. On Savana and Express, remove left kick panel. Place parking brake lever in full upright position. With an assistant in vehicle, raise and support vehicle. Pull rearward on front of cable strand until parking brake lever reaches its full reset position. Insert a pin into parking brake lever to hold tension. See **Fig. 6** . On all models, remove wheel. Reference mark rear brake drum-to-axle. Remove brake drum (if necessary, back off adjuster wheel before removing brake drum). To install, reverse removal procedure. Adjust rear brake shoes. See REAR BRAKE SHOES under **ADJUSTMENTS** .

REAR BRAKE SHOES

NOTE: For rear brake shoe removal and installation, see **Fig. 6** , 16 and 17. **DO NOT** interchange left and right adjusting screw assemblies as one side is right-hand thread and other is left-hand thread.

WHEEL CYLINDER

Removal & Installation

Remove rear brake shoes. See REAR BRAKE SHOES under **REMOVAL & INSTALLATION** . Disconnect brake line from wheel cylinder. Remove brake cylinder retaining bolts and brake cylinder. To install, reverse removal procedure. Bleed brake system. See MANUAL BLEEDING or PRESSURE BLEEDING under **BLEEDING BRAKE SYSTEM** .

MASTER CYLINDER

Removal

1. With engine off, press brake pedal several times to release vacuum in power brake unit. Clean dirt and

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

grease from master cylinder brake line fittings. Disconnect brake lines from master cylinder and plug line ends.

2. On vehicles with combination valve and bracket attached to master cylinder mounting studs, remove combination valve and bracket. On vehicles without power brake unit, disconnect brake pedal push rod at brake pedal. On all vehicles, remove master cylinder retaining nuts and master cylinder.

Installation

1. Bench bleed master cylinder before installing. See MASTER CYLINDER BLEEDING under **BLEEDING BRAKE SYSTEM** . Position master cylinder on mounting studs. Position combination valve and bracket on mounting studs (if applicable). Loosely install master cylinder retaining nuts. Connect brake lines to master cylinder but DO NOT tighten.
2. Tighten master cylinder retaining nuts. Tighten brake lines. Connect brake pedal push rod (if disconnected). Fill fluid reservoir. Bleed brake system. See MANUAL BLEEDING or PRESSURE BLEEDING under **BLEEDING BRAKE SYSTEM** .

POWER BRAKE BOOSTER

Removal & Installation

1. Remove master cylinder. See MASTER CYLINDER under **REMOVAL & INSTALLATION** . Ensure no brake fluid contacts ABS control unit or related electrical connectors and wiring.
2. Disconnect vacuum hose from booster. Disconnect booster push rod from brake pedal. Remove booster mounting nuts from inside vehicle. Remove booster and gasket.
3. To install, reverse removal procedure. Bleed brake system if lines were disconnected from master cylinder. See MANUAL BLEEDING or PRESSURE BLEEDING under **BLEEDING BRAKE SYSTEM** .

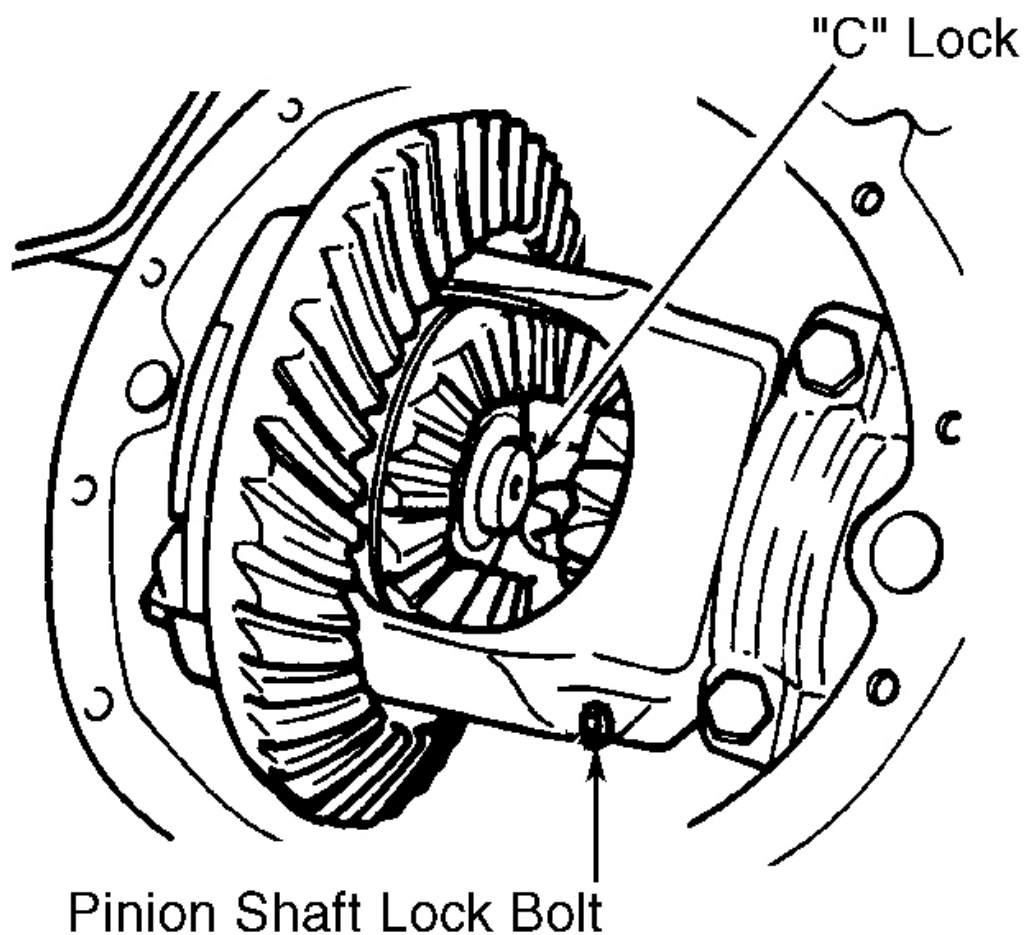
REAR AXLE BEARING & OIL SEAL (SEMI-FLOATING AXLE)

Removal

1. Raise and support vehicle. Remove wheels and brake drums. Loosen differential cover plate and drain lubricant from axle. Remove cover plate.
2. Remove pinion shaft lock bolt. See **Fig. 3** and **Fig. 4** . Remove pinion shaft. Push axle shaft toward center of vehicle and remove "C" lock from end of axle shaft. Remove axle shaft.
3. Pry seal from axle housing. Using Slide Hammer (J-2619-01) and Axle Bearing Puller (J-22813-01), remove bearing from axle housing.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

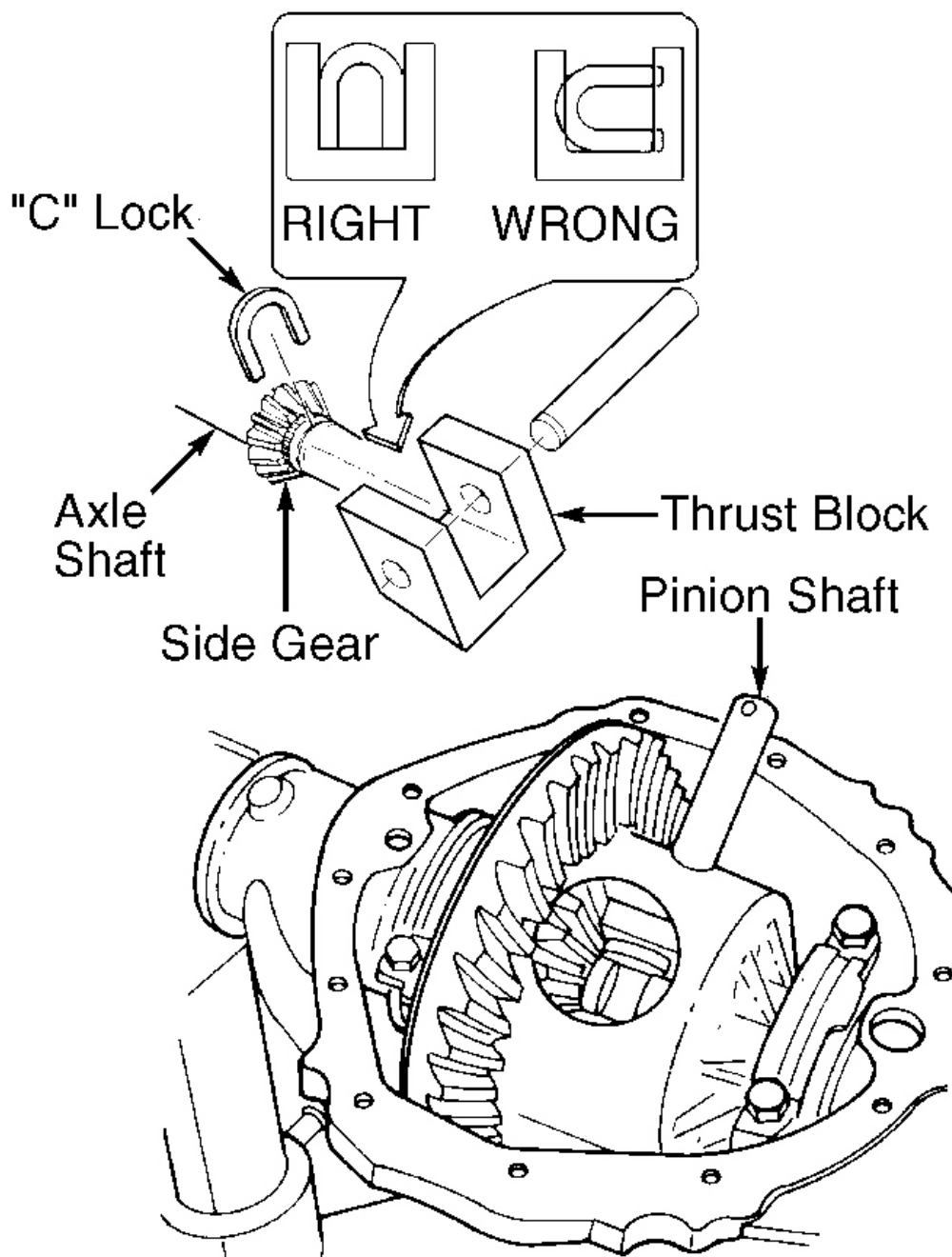


G90A13573

Fig. 3: Locating "C" Lock & Pinion Shaft Lock Bolt
Courtesy of GENERAL MOTORS CORP.

Installation

1. Lubricate bearing with gear lubricant. Using Handle (J-8092) and Bearing Installer (J-23765), install bearing in axle housing until bearing installer bottoms against shoulder of axle housing.
2. Using Seal Installer (J-23771), install seal until even with surface of axle housing. Lubricate seal lips with gear lubricant. Install axle shaft and "C" lock. See **Fig. 3** and **Fig. 4** . Pull axle shaft outward to ensure "C" lock seats in side gear.
3. Install pinion shaft. Install NEW pinion shaft lock bolt. Tighten lock bolt to 25 ft. lbs. (34 N.m). Install differential cover and new gasket. Fill drive axle with gear lubricant.



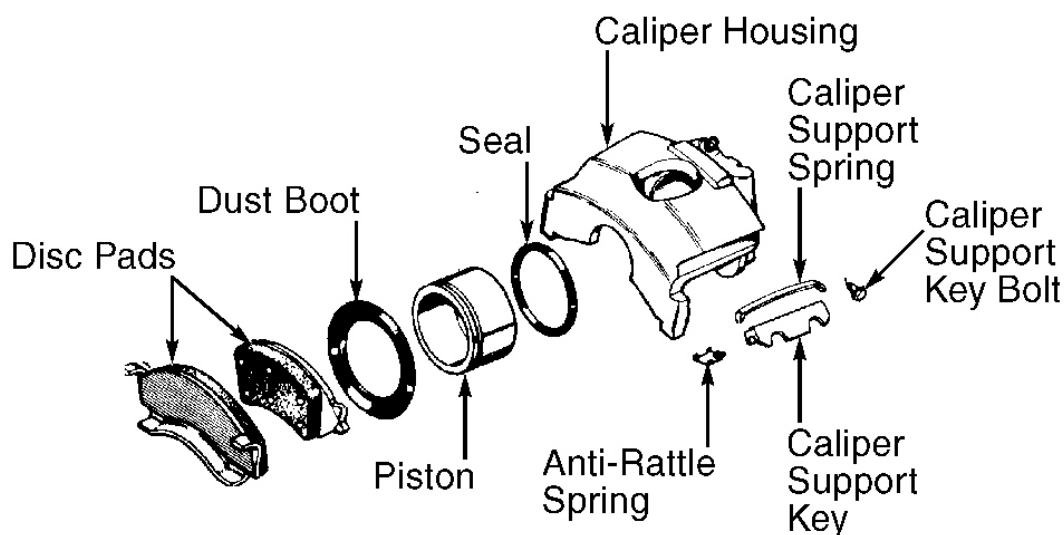
G95E27106

Fig. 4: Removing & Installing "C" Lock & Pinion Shaft On Locking Differential (Typical)
Courtesy of GENERAL MOTORS CORP.

OVERHAUL

NOTE: Use exploded view illustrations for overhaul of brake assemblies. See Fig. 5 - Fig. 12 .

WARNING: DO NOT hone master cylinder bore. Honing destroys hardened surface, causing premature piston seal failure. If bore surface is rough or pitted, replace master cylinder.



95G27108

Fig. 5: Exploded View Of Sliding Caliper Assembly (Typical)
Courtesy of GENERAL MOTORS CORP.

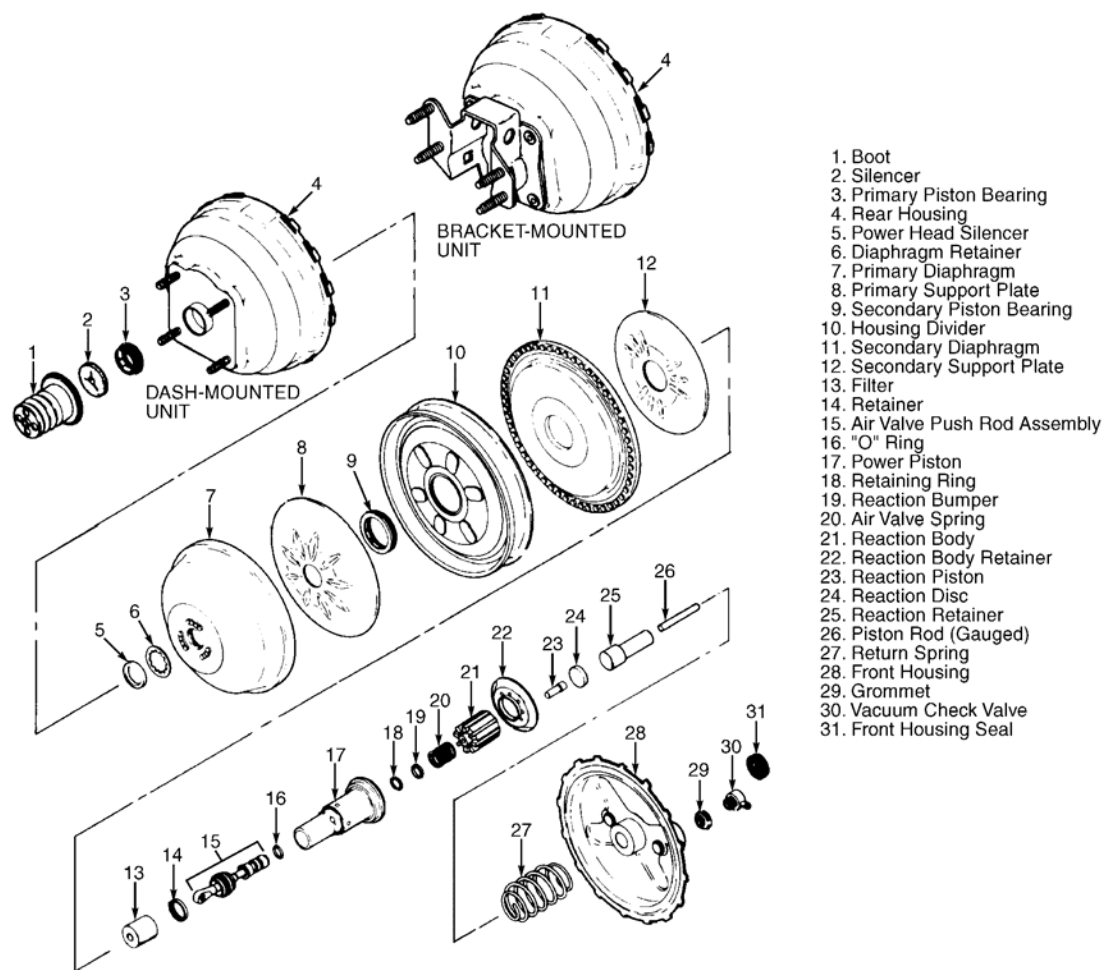
BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors



Fig. 6: Exploded View Of Rear Brake Assembly
Courtesy of GENERAL MOTORS CORP.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

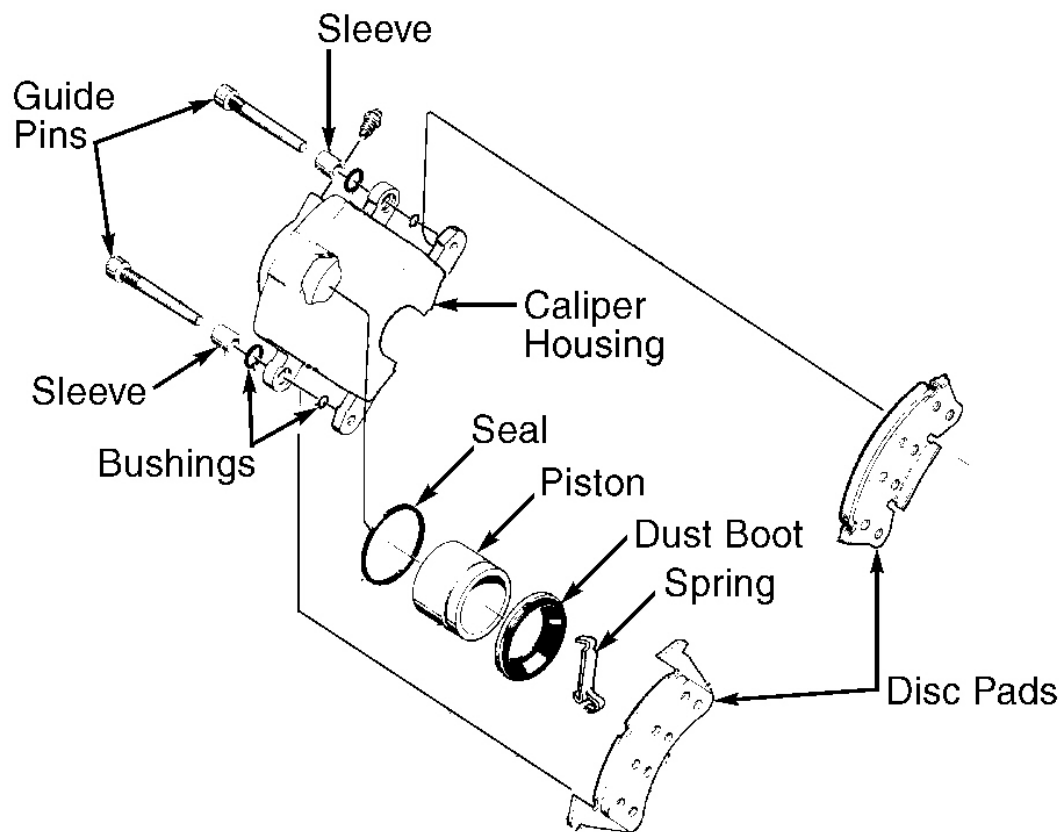


G91A13508

Fig. 7: Exploded View Of Power Brake Booster (Dual Diaphragm)
 Courtesy of GENERAL MOTORS CORP.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

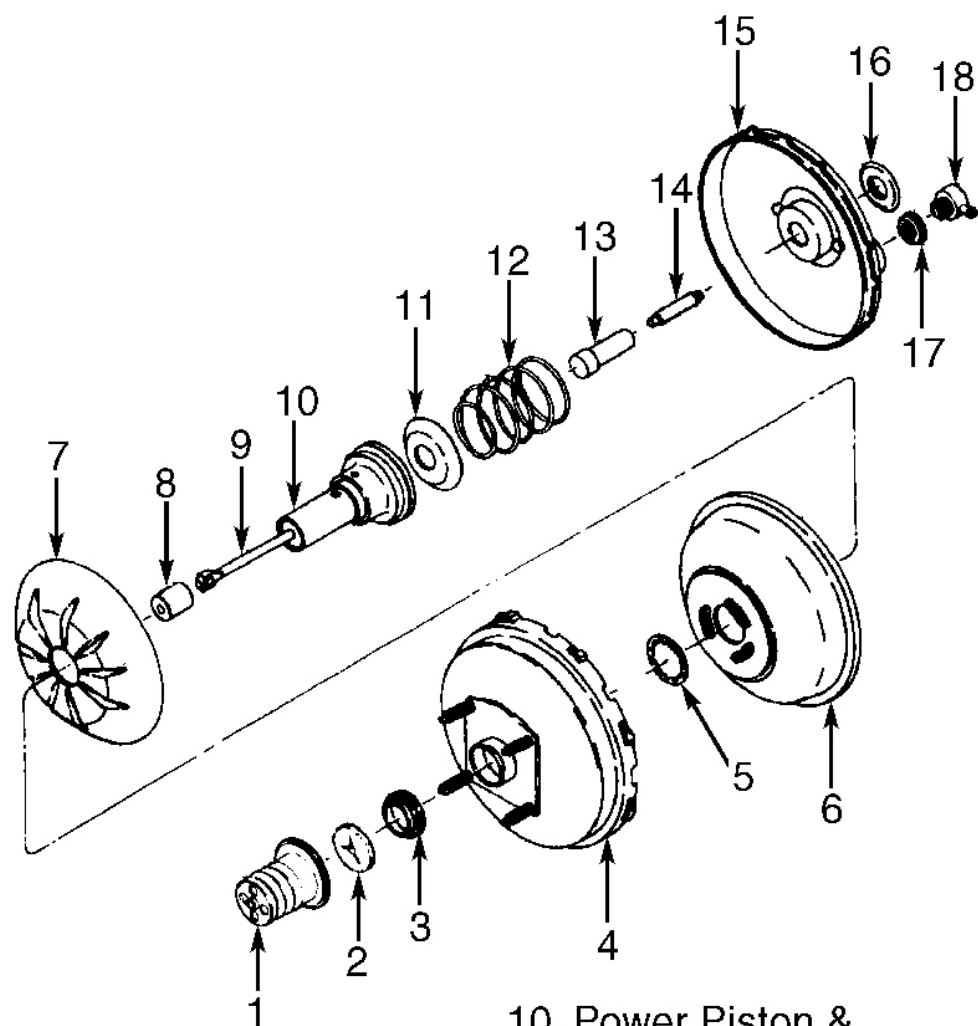


95F27107

Fig. 8: Exploded View Of Floating Caliper Assembly (Typical)
Courtesy of GENERAL MOTORS CORP.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors



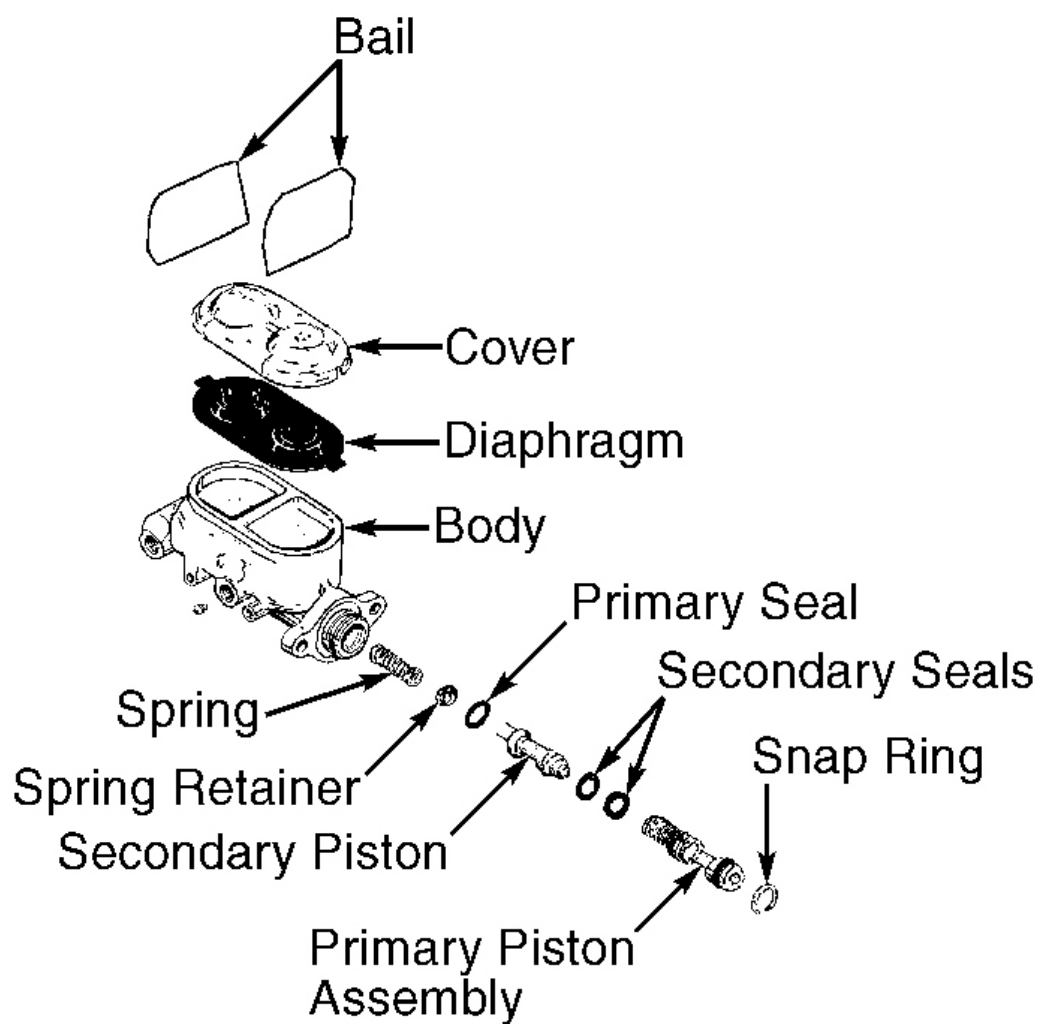
- 1. Boot
- 2. Silencer
- 3. Power Piston Bearing
- 4. Rear Housing
- 5. Diaphragm Retainer
- 6. Diaphragm
- 7. Diaphragm Support
- 8. Filter
- 9. Push Rod

- 10. Power Piston & Push Rod Assembly
- 11. Reaction Body Retainer
- 12. Return Spring
- 13. Reaction Retainer
- 14. Piston Rod (Gauged)
- 15. Front Housing
- 16. Front Housing Seal
- 17. Grommet
- 18. Vacuum Check Valve

G91B13509

Fig. 9: Exploded View Of Power Brake Booster (Single Diaphragm)

Courtesy of GENERAL MOTORS CORP.

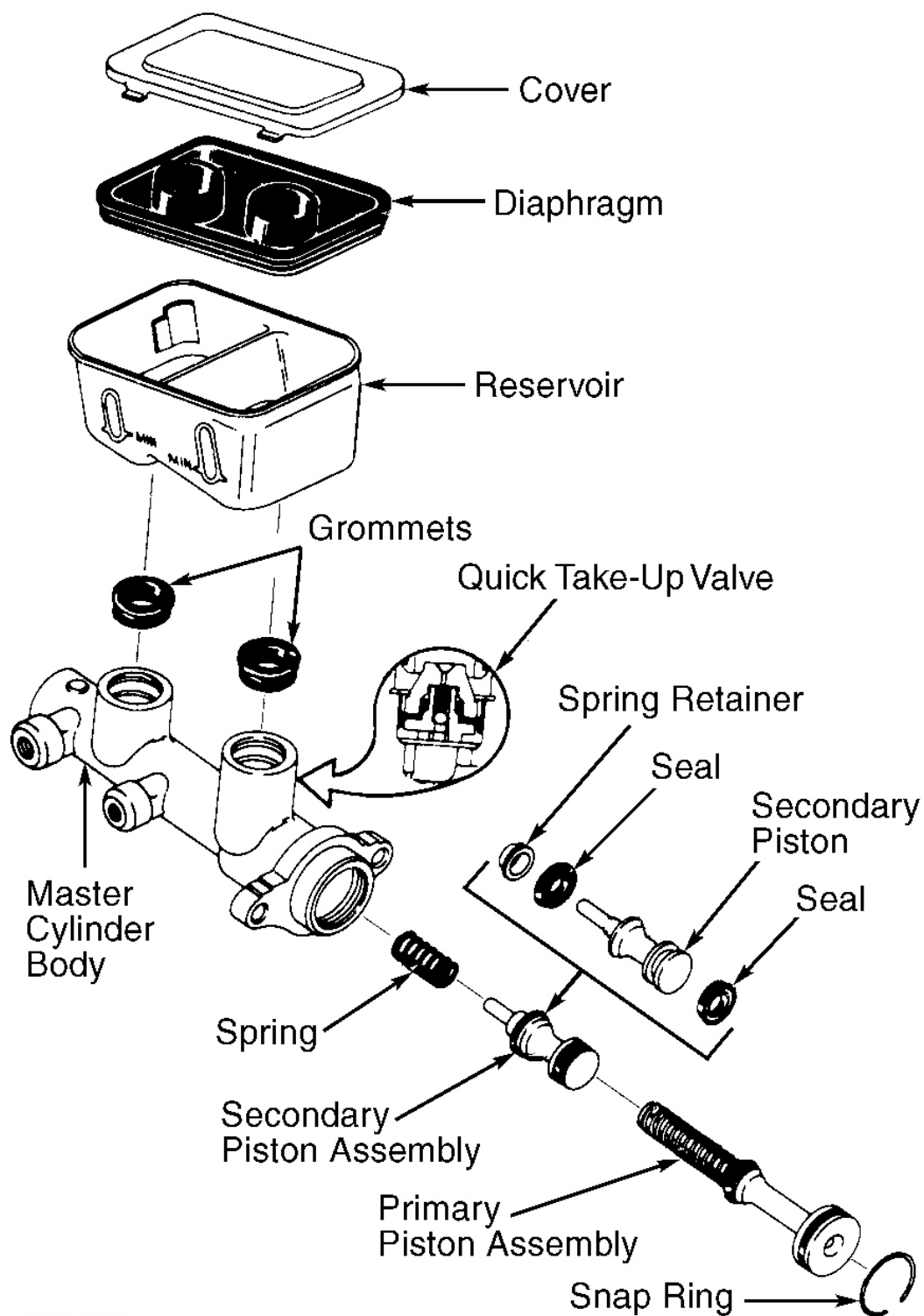


G95A27110

Fig. 10: Exploded View Of Cast Iron Master Cylinder
Courtesy of GENERAL MOTORS CORP.

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors



G95B27111

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

Fig. 11: Exploded View Of Composite Master Cylinder
Courtesy of GENERAL MOTORS CORP.

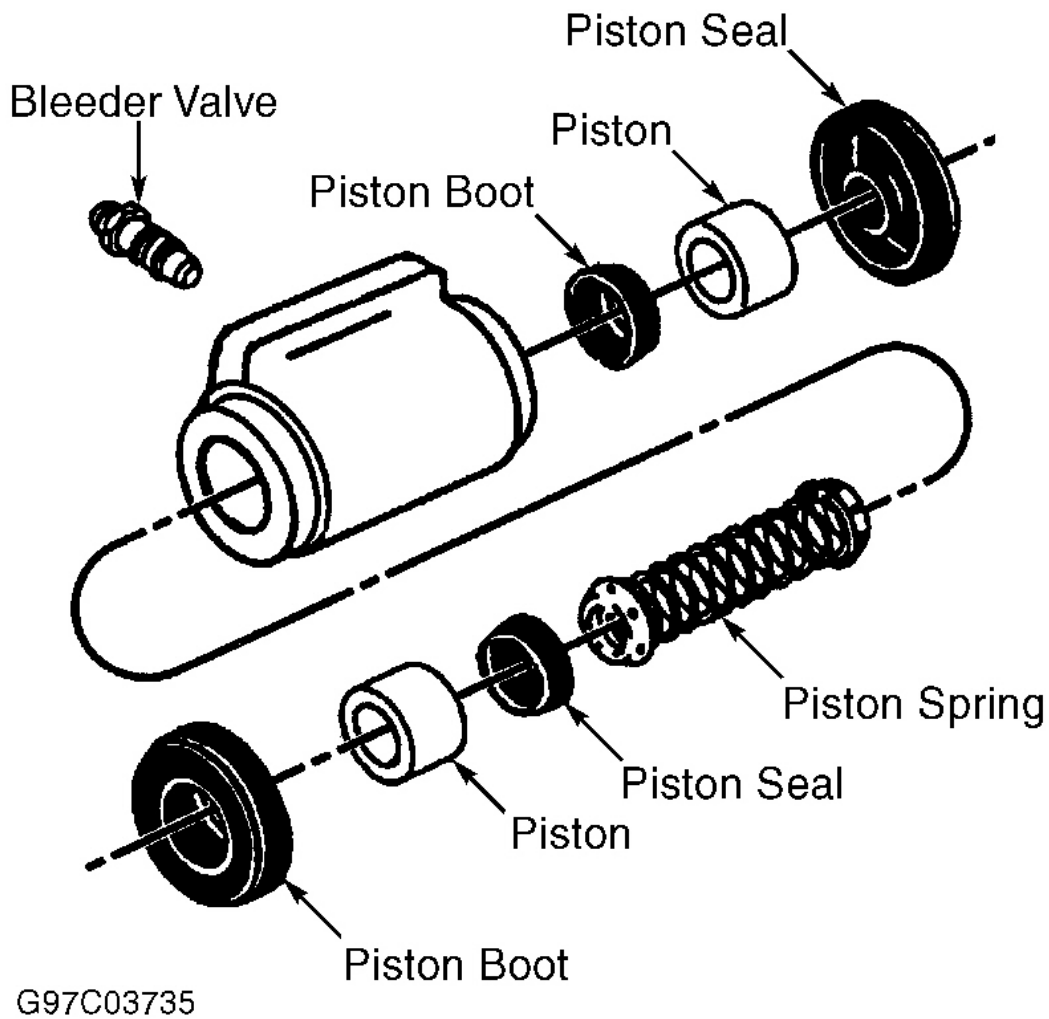


Fig. 12: Exploded View Of Rear Wheel Cylinder (Typical)
Courtesy of GENERAL MOTORS CORP.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Backing Plate Bolts	103 (140)
Brake Cylinder Bolts	15 (20)

1997 Chevrolet S10 Pickup

BRAKE SYSTEM 1997 BRAKES Disc & Drum - General Motors

Brake Line Fittings (Except To EBCM)	22 (30)
Brake Line Fittings (To EBCM)	15 (20)
Brake Hoses	15 (20)
Banjo Bolts-To-Front Caliper	37 (50)
Caliper Guide Pin (Floating Caliper)	37 (50)
Caliper Support Key Bolt (Sliding Caliper)	15 (20)
Combination Valve Allen Bolts	12 (16)
Differential Cover Bolt	20 (27)
Front Brake Hose-To-Caliper Bolt	32 (43)
Pinion Shaft Lock Bolt ⁽¹⁾	
Standard Differential	25 (34)
Locking Differential	
7 5/8", 8 1/2" & 8 5/8 Ring Gear	27 (37)
9 1/2" Ring Gear	37 (50)
Power Booster Nuts	27 (37)
Wheel Lug Nut	95 (130)
(1) Use NEW pinion shaft lock bolt. DO NOT reuse bolt.	

DRUM BRAKE SPECIFICATIONS

DRUM BRAKE SPECIFICATIONS

Application	In. (mm)
Original Diameter	9.50 (241.3)
Discard Diameter	9.59 (243.6)
Maximum Refinish Diameter	9.56 (242.8)
Width	2.00 (50.8)

DISC BRAKE SPECIFICATIONS

DISC BRAKE SPECIFICATIONS

Application	In. (mm)
Lateral Runout	.004 (.10)
Parallelism	.0005 (.013)
Original Thickness	1.03 (26.2)
Minimum Refinish Thickness ⁽¹⁾	.980 (24.89)
Discard Thickness	.965 (24.51)
(1) Use specification stamped on rotor (if available).	